PROPOSAL FOR Ph.D. REGISTRATION

Proposed Research Work

Title:

"SYNTHESIS, CHARACTERISATION AND BIOLOGICAL ACTIVITY STUDIES OF TRANSITION METAL COMPLEXES OF SOME SUBSTITUTED-ORTHO-HYDROXY CHALCONE DERIVATIVES"

1. Introduction

Substituted Ortho-Hydroxy Chalcones are reported for their varied biological activities like antibacterial, antifungal, anticancer, antitumor, antiviral, antitubercular, antiulcer, antimalarial and antidiabetic agents. Substituted hydroxyacetophenones are the starting material for the synthesis of Substituted Ortho-Hydroxy Chalcones which are of great importance in medicinal chemistry.

Transition metal ions bound to organic ligands have been found to possess different activities and have wide applications in analytical, catalysis, biological, medicinal, microbial and insecticidal fields. The diverse applications of metal chelates may be due to unused co-ordination sides of complex ligand systems or due to selective oxidation states of complex metal ions in coordination sphere.

2. Review of Literature

The studies on chelating behavior of Substituted Ortho-Hydroxy Chalcones have been catching much attention because of their vast potentiality as versatile coordinating agents in variety of biological activities and numerous applications in different field of chemistry. The research on these compounds due to their physiological activity is attributable to their ability to chelate traces of metal ion(s).

The anti-HIV and cytotoxic activities of Ru(II)/Ru(III) polypyridyl complexes containing 2,6-(2'-Benzimidazolyl)-pyridine/chalcone as co-ligand have been reported in recent times. antimicrobial activity of some transition metal complexes of naphthalene analogues of substituted -2'-hydroxychalcones was studied by different scientists.

The increasing biological relevance of Substituted Ortho-Hydroxy Chalcones system involving oxygen atoms prompted us the prospect of exploring the capabilities of such systems to act as mononegative bidentate ligands with biologically important metal ions to form stable complexes in solution and solid state. For the new hydroxyl Chalcones, literature survey reveals that their respective transition metal complexes are not reported. Hence it is thought to be useful to synthesize the transition metal complexes of the substituted 2'-hydroxychalcones and to study their antimicrobial activities.

3. Objectives

The objectives of proposed study are:

- To synthesize novel bioactive substituted Ortho-Hydroxy Chalcones and their derivatives viz., 2-pyrazolines and N-acetyl pyrazolines.
- To confirm their structures by spectral data (IR, ^{1}H NMR, and Mass).
- To evaluate these newly synthesized derivatives for their biological properties.
- To synthesize complexes of Cu(II), Ni(II), Co(II), Fe(II) and Zn(II) with new Substituted Ortho-Hydroxy Chalcones as ligands.
- To establish their chemical composition and physiochemical properties. The molar conductivity, magnetic moment, UV-Visible, IR, ^{1}H NMR, ESR, XRD, and TGA spectral data of synthesized complexes will be studied.
- To study the antibacterial and antifungal study of all newly synthesized Substituted Ortho-Hydroxy Chalcones, 2- pyrazolines N-acetyl pyrazoline and metal complexes against different plant and human pathogens.

4. Methodology

- First literature survey will be done and Substituted Ortho-Hydroxy Chalcones will be synthesized and characterized by spectral analysis.
- The synthesized compound will be purified by **Coloumn/ HPLC** Chromatography.
- The new Chalcones will be converted into their heterocycles like pyrazoline and N-acetyl pyrazolines. Their structures will be confirmed by their spectral analysis.
- Their metal complexes with Cu(II), Ni(II), Co(II), Fe(II) and Zn(II) will be prepared and their molar conductivity, magnetic moment, UV-Visible, IR, ^{1}H NMR, ESR, XRD and TGA spectral data of synthesized complexes will be studied.
- New compounds will be screened in-vitro for antifungal, antibacterial properties.
- Results, Discussion and analysis(conclusion)

5. Significance of the study

Today number of bacterial, fungal diseases and multidrug resistance developed in microbes for various drugs are the biggest issues to health concerns at the global level.

Research in this area is very active and is directed towards the synthesis of compounds with enhanced pharmacological potency. As well as most of complexes are being used as pharmaceuticals. Therefore, in the present study new complexes of transition metals will synthesize using Substituted Ortho -Hydroxy Chalcones and their derivatives.

The newly synthesized derivatives after their screening against different plant and human pathogens for antibacterial and antifungal properties can be explored as potential candidates for future drugs.

6. Proposed Work Plan

1st year

- Literature survey (2 months)
- Synthesis of potential Substituted Ortho-Hydroxy Chalcones (6 months)
- Synthesis of new pyrazolines from Substituted Ortho-Hydroxy Chalcones (4 months)

2nd year

Synthesis of N-acetyl pyrazolines from Substituted Ortho-Hydroxy Chalcones (4 months).

- Synthesis of potential transition metal complexes of some Substituted Ortho-Hydroxy Chalcones (8 months).
- Communication of research articles to reputed journals.

3rd year

- Antimicrobial screening and $\mathbf{IC_{50}}$ value studies of some Substituted Ortho-Hydroxy Chalcones and their heterocycles.(3 months)
- Antimicrobial screening and $\mathbf{IC_{50}}$ value studies of new transition metal complexes. (3 months)
- Communication of research articles to reputed journals.
- Submission of final synopsis.

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